Determination of the Density Change of Glass by a Sink-Float Method. (II) : Funtamental Study for a Quality Control Method Applicable to Japanese Glass Industry

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17. Determination of the Density Change of Glass by a Sink-Float Method. (II)

Funtamental Study for a Quality Control Method Applicable to Japanese Glass Industry.

Masao Mine, Tamotsu Yamate and *Toyomi Akiyama.*

A sink-float method of measuring small variations of density of glass was studied. As a heavy liquid, the density of which is comparable with that of glass, a water solution of $KI+HgI_2$ was used.

Predetermined temperature coefficient of the density of the liquid was 0.0012g/cc/°C. The equi-density temperatures of the liquid to glass samples were measured with preciseness of 0.1°C and were compared with those of the standard specimens.

The density of glass rod drawn and rapidly cooled in air decreases with decreasing thickness of it, and the difference of density caused by that of thikness disappears by the annealing. The densities of unannealed rods of 4.3±0.2 mm thick increase $(80\mp1)\times10^{-4}$ by the annealing.

If well annealed, the densities of the samples, taken out in any period from the reaching maximum melting temperature over 1400°C to the end of the working, were found to be nearly the same within the range of $\pm2\times10^{-4}$.

Accordingly the density data of unannealed glass rods of the same thickness indicate obviously the variations of qualities of glass melted daily in a pot. As an example, the avarage density of glass rods of 4.3±0.2 mm thick taken daily from a pot in definite position in a direct-fired furnace of a plant for two months long was 2.4885, and the range of density variation of daily samples was $\pm50\times10^{-4}$.

The authors are convinced that this method of measuring density is applicable effectively even to the small scale plants in this country which are operated with direct-fired pot furnaces.

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18. Study on High Dielectric Constant Ceramics. (III)

Electrostrictive and Piezoelectric Effect of $BaTiO_3$ Ceramics.

Kiyoshi Abe and *Tetsuro Tanaka.*

$BaTiO_3$ ceramic has ferroelectric properties in the temperature range below Curie point, and in this temperature range also shows electrostrictive effect. We measured this effect directly by an apparatus similar to those generally used for measuring magnetostriction. The apparatus consists of a moving rod, roller with mirror, scale and telescope etc., and small amount of expansion or contraction is